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Anencephaly in Texas Border Counties 1986-1991

Anencephaly is a fatal birth defect in which most of the brain is absent.[1] This defect is associated with defective closure of the neural tube during embryogenesis.

Anencephaly became a major concern in Texas in 1991 as the Texas Department of Health (TDH) and U.S. Centers for Disease Control (CDC) initiated an investigation of an apparent cluster of neural tube birth defects in Cameron County, Texas. Based on active surveillance using multiple sources such as hospital, clinic and vital records, the rate for anencephaly in Cameron County for 1986-1991 was 13.0/10,000, four times the national average. The anencephaly rate in Cameron County peaked during 1990 and 1991 at 19.7/10,000. Thirty percent of the anencephaly cases included in the surveillance, however, were < 20 weeks gestational age at the time of delivery.

A total of 90 cases of anencephaly were identified for 1986-1991 for the 14 Texas border counties.

Alerted by the exceptionally high rate of anencephaly found in Cameron County, we decided to examine the prevalence of anencephalic births in all Texas counties bordering Mexico, utilizing live birth, death, and fetal death records for 1986 through 1991.

Methods

All deaths for the period of 1986 through 1991 that were classified in the International Classification of Diseases (ninth revision) rubric 740.0-740.2 (anencephalus and similar anomalies) were identified through the TDH Bureau of Vital Statistics (BVS).[2] These records were manually linked to live births. Fetal death records were manually searched for documentation of anencephaly. In Texas, fetal death registration is required only for those cases with a gestation period of 20 weeks or more. Only births to mothers who identified their residence as one of the 14 Texas counties bordering Mexico were included in the calculation of rates. This survey does not include information from hospital or clinic records.

For 1986 through 1989, births and fetal deaths were classified into non-Spanish-surnamed whites and Spanish-surnamed whites. Because of a change of how ethnicity is designated, race and ethnicity were classified by mothers' self-stated race and ethnicity for 1990 and 1991.

Using BVS statistical data for live births, prevalence rates for anencephaly were calculated for the following variables: county and city of residence; ethnicity and race; mother's parity; and maternal age. All prevalence rates are expressed as the

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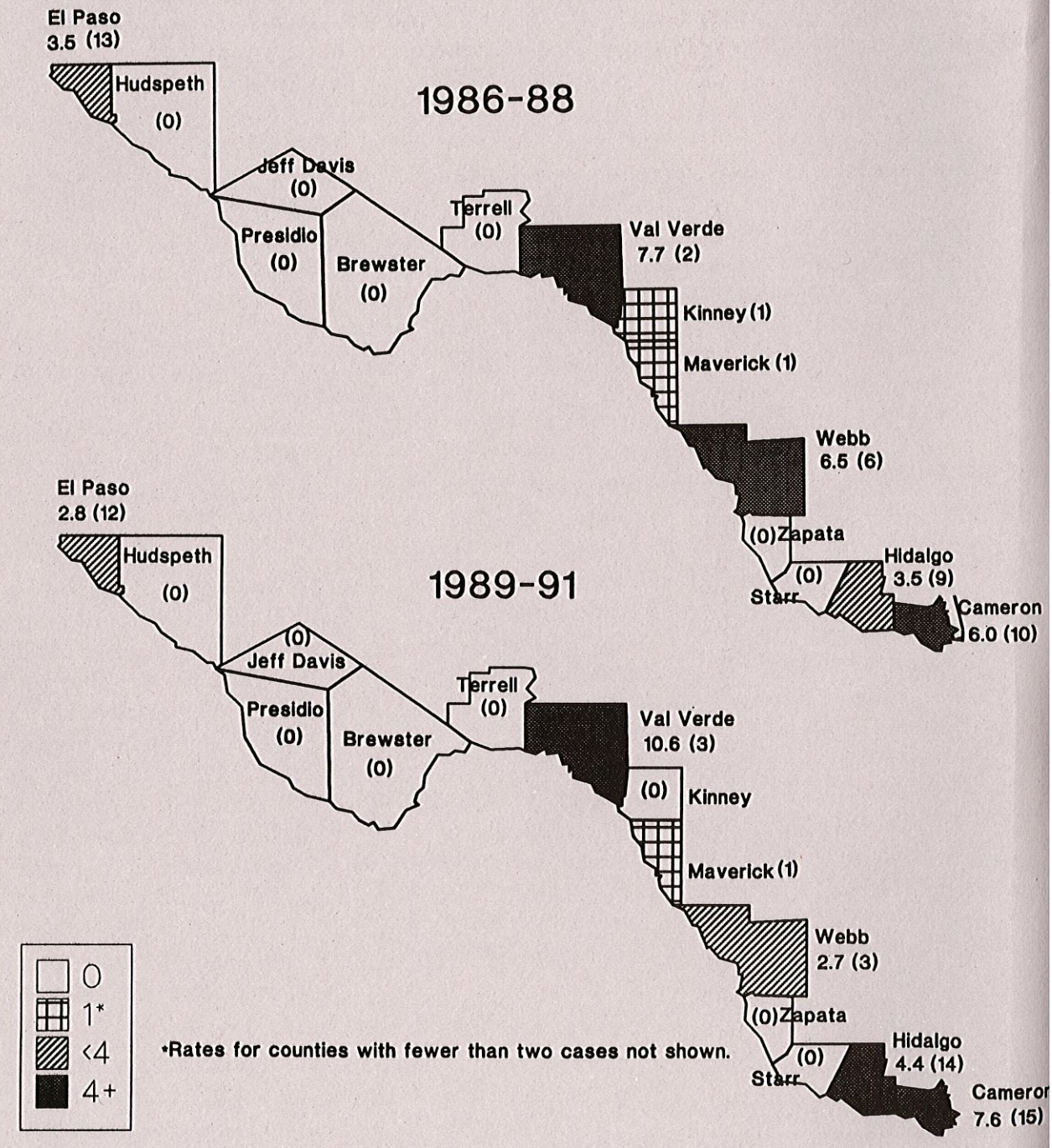
Figure 1. Mean Annual Anencephaly Rates* Per 10,000 Live Births and Number of Cases ( ) Texas Border Counties



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number of anencephaly cases per 10,000 live births.

Results

A total of 90 cases of anencephaly were identified for 1986-1991 for the 14 Texas border counties. Figure 1 shows the mean annual prevalence rates by county for 1986-1988 and 1989-1991.

For both time periods, Val Verde County residents had the highest prevalence rates (7.7-10.6/10,000 live births) followed by Cameron County residents (6.0-7.6/10,000 live births). Among the six major border cities, Del Rio (Val Verde County) had the highest prevalence rates of anencephaly followed by Brownsville (Cameron County) (Table 1). Rates of anencephaly in Texas border cities varied from 1.6/10,000 live births in McAllen for 1989-1991 to 12.8/10,000 live births for Del Rio during the same time period.

Rates of anencephalic births were consistently higher for Hispanics (4.2-4.6/10,000 live births) than for white, non-Hispanics (2.8-3.8/10,000) (Table 2). Table 3 shows anencephaly prevalence rates by the mother's number of previous live births. Mothers with two or more previous live births had higher prevalence rates for anencephalic births than mothers who had either no or one previous live birth.

Table 4 shows anencephaly rates by maternal age. Mothers who were 35 years and older had the highest prevalence of anencephalic births. No clear trend was noted for prevalence of anencephaly by maternal age, however.

Discussion

Prevalence rates for anencephaly varied widely across the 14 Texas border counties. These differences could be due to differential reporting of anencephaly on death and fetal death records, differing rates in prenatal diagnosis and elective terminations or differences in actual risk for this defect. Over the two time periods studied, rates for El Paso county remained consistently low while rates for Val Verde and Cameron Counties remained consistently high. These differences were not explained by differences in ethnic and racial differences among mothers and births in these counties.

Table 2. Anencephaly Rates by Ethnicity/Race Texas Border Counties, 1986-1991

	1986-1989*		1990-1991**	
	Anencephaly Cases	Rate/10,000 Live Births	Anencephaly Cases	Rate/10,000 Live Births
White	9	3.8	2	2.8
Hispanic	45	4.2	33	4.6
Black	1	3.9	--	--

* Ethnicity classified by surname
** Race/Ethnicity classified by the mother's self-stated race/ethnicity

Table 1. Anencephaly Rates by Border City Texas, 1986-1991

	1986-1988		1989-1991	
	Anencephaly Cases	Rate/10,000 Live Births	Anencephaly Cases	Rate/10,00 Live Births
El Paso	13	3.9	11	2.8
Del Rio	2	9.3	3	12.8
Eagle Pass	--	--	1	5.5
Laredo	5	5.7	3	2.7
McAllen	3	5.7	1	1.6
Brownsville	6	7.6	10	10.1

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As in a previous review of anencephalic births in Texas[3], Hispanics had higher rates of anencephalic births than either non-Hispanic whites or Blacks. Other studies have also found Hispanic births to have higher rates of anencephaly than non-Hispanic whites.[4] Mean annual prevalence rates of anencephaly for Mexico have been reported to be 18.4 per 10,000 infants.[5] The reasons for these differences by ethnicity are not clear, but might be due to genetic factors, socioeconomic conditions, diet and vitamin intake, prenatal diagnosis and elective terminations, maternal and/or paternal occupational exposures, or underlying health problems (i.e. diabetes).

Table 3. Anencephaly Rates by Parity Texas Border Counties, 1986-1991*

Number of Previous Live Births	Anencephaly Cases	Number of Live Births	Rate/10,000 Live Births
0	25	79,334	3.2
1	20	62,970	3.2
2-3	31	56,917	5.4
4+	8	14,620	5.5

* 6 had missing information

Table 4. Anencephaly Rates by Maternal Age Texas Border Counties, 1986-1991*

Maternal Age (years)	Anencephaly Cases	Number of Live Births	Rate/10,000 Live Births
0<2	10	33,133	3.0
20-24	32	65,426	4.9
25-29	21	61,105	3.4
30-34	12	36,871	3.3
35+	9	17,081	5.3

* 6 had missing information

In the Texas border counties, mothers of higher parity appeared to have a higher risk for anencephalic births. Among Texas births for 1981-1986, prevalence of anencephaly also increased with the mother's number of previous live births.[3] Some previous literature has indicated a strong U-shaped association with parity, while other studies have found increased risk of anencephalic births as parity increases.[6]

With respect to the effect of maternal age, some studies have shown risk for anencephalic births to decrease with increasing maternal age while others have found increased risk with increasing maternal age.[6] No trend for maternal age was noted in the Texas border counties during 1986-1991.

The cluster investigation in Cameron County yielded higher rates for anencephaly than this survey based on vital records. These differences were due to more complete case ascertainment and the inclusion of cases less than 20 weeks gestation in the cluster investigation.

Further research is needed to investigate the causes of higher rates of anencephaly and other neural tube defects (NTDs) among Hispanics. Active surveillance for neural tube defects and interviews with parents of affected offspring and appropriate comparison among parents would help elucidate specific risk factors for Hispanics.

Based on the evidence that folic acid will reduce the number of cases of NTDs, the Centers for Disease Control recently released specific recommendations for the use of folic acid to reduce NTDs.[7] All women of childbearing age in the United States who are capable of becoming pregnant are recommended to consume

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0.4 mg of folic acid per day for the purpose of reducing their risk of having a pregnancy affected with spina bifida or other NTDs.[7]

Birth defect surveillance programs will be invaluable in assessing the impact of this recommendation and its implementation on the prevalence of NTDs in the future. Texas does not currently have a birth defect registry. Efforts are underway, however, at the Texas Department of Health to implement an active surveillance system for case-finding and educational activities in the Texas border counties for the purposes of establishing baseline NTD rates, better understanding of risk factors for NTDs, and implementing the CDC recommendations for folic acid. Such surveillance and follow up activities will help assess the impact of folic acid on both the occurrence and recurrence of neural tube defects in this region of Texas.

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St. Louis Encephalitis

Since August 1, 1993, three cases of Saint Louis Encephalitis (SLE) have been reported from Nueces County. Two men, ages 19 and 27 years, and a 61 year-old woman were hospitalized. All three resided in north central Corpus Christi and became ill in August.

St. Louis encephalitis, a viral illness that primarily affects the central nervous system, is transmitted to humans by the bite of an infected mosquito. Common signs and symptoms include fever, headache, nausea and vomiting, confusion, and a stiff neck. The severity of the illness increases with increasing age.

Since July 21, 1993, SLE virus has been identified in mosquito collections from eight locations in Corpus Christi. As of Friday, September 3, no additional patients with SLE were hospitalized in the Corpus Christi area.

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